

10 Claims:

1. Process for producing ethane, characterized in that it comprises bringing methane into contact with a metal catalyst selected from metal hydrides, metal organic compounds and mixtures thereof.
2. Process according to Claim 1, characterized in that the metal catalyst comprises at least one metal, Me, chosen from the lanthanides, the actinides and the metals from Groups 2 to 12, preferably 3 to 12, of the Periodic Table of the Elements.
3. Process for the conversion of methane to carbon-containing products, characterized in that methane is brought into contact with a metal catalyst comprising at least one metal, Me, chosen from the lanthanides, the actinides and the metals from Groups 2 to 12, preferably 3 to 12, of the Periodic Table of the Elements, so as to produce ethane in a proportion of at least 65% by weight with respect to carbon-containing products formed in the process.
4. Process according to Claim 3, characterized in that ethane is produced in a proportion of at least 70%, preferably of at least 80%, in particular of at least 90%, especially of at least 95%, more especially of at least 98% or 99%, by weight with respect to carbon-containing products formed in the process.
5. Process according to Claim 3 or 4, characterized in that the metal catalyst is chosen from metal hydrides, metal organic compounds and mixtures thereof.
6. Process according to any one of Claims 1 to 5, characterized in that it is carried out under conditions involving a non-oxidative coupling of methane.

7. Process according to any one of Claims 1 to 6, characterized in that it comprises bringing methane into contact with the metal catalyst in the presence of one or more other initial alkanes, preferably C₂ to C₃₀ alkanes.

8. Process according to any one of Claims 1 to 7, characterized in that it is a single-
5 stage process.

9. Process according to any one of Claims 1 to 8, characterized in that it is carried out with operating conditions maintained substantially constant, preferably continuously, during the ethane production.

10. Process according to any one of Claims 1 to 9, characterized in that it is carried
10 out under a total absolute pressure ranging from 10⁻³ to 100 MPa, preferably from 0.1 to 50 MPa, in particular from 0.1 to 30 MPa or from 0.1 to 20 MPa, especially from 0.1 to 10 MPa.

11. Process according to any one of Claims 1 to 10, characterized in that it is carried
15 out at a temperature ranging from -30°C to +800°C, preferably from 0 to 600°C, in particular from 20 to 500°C, especially from 50 to 450°C.

12. Process according to any one of Claims 1 to 11, characterized in that it is carried out in the presence of one or more inert agents, in particular liquid or gaseous inert agents, especially in the presence of one or more inert gases.

13. Process according to any one of Claims 1 to 12, characterized in that the metal
20 catalyst is chosen from metal catalysts supported on and preferably grafted to a solid support.

14. Process according to Claim 13, characterized in that the solid support is chosen
from inorganic solid supports, preferably from metal oxides, refractory oxides,
molecular sieves, sulphated metal oxides, sulphated refractory oxides, metal sulphides,
25 refractory sulphides, sulphided metal oxides, sulphided refractory oxides and azides.

15. Process according to any one of Claims 1 to 14, characterized in that the metal,
Me, of the metal catalyst is at least one metal chosen from yttrium, scandium,
lanthanum, titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium,
molybdenum, tungsten, rhenium, iron, ruthenium, cobalt, rhodium, iridium, nickel,
30 palladium, platinum, cerium and neodymium.

16. Process according to Claim 15, characterized in that the metal, Me, is at least one metal chosen from yttrium, titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum, tungsten, ruthenium, rhodium and platinum.
17. Process according to Claim 15, characterized in that the metal, Me, is at least one metal chosen from yttrium, vanadium, niobium, tantalum, chromium, molybdenum, tungsten, ruthenium, rhodium and platinum.
18. Process according to any one of Claims 1 to 17, characterized in that it is carried out in gas phase, in particular in a fluidized bed reactor and/or a reactor with a mechanically stirred bed, or a stationary bed reactor or circulating bed reactor.
19. Process according to Claim 18, characterized in that the metal catalyst is used in a solid form, essentially forming the bed of the reactor.

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